

## Curriculum Vitae

Dr. Konstantinos Horaites

<https://orcid.org/0000-0002-0759-2964>

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## Degree

- PhD in Physics; with Math minor  
University of Wisconsin-Madison; Madison, WI, USA (August 25, 2019).  
Contact—Phone: (608) 262-4526, E-mail: [info@physics.wisc.edu](mailto:info@physics.wisc.edu)
- BA, Majors in Physics and Astrophysics  
University of California, Berkeley; Berkeley, CA, USA (May 13, 2011).

## Current employment

- Postdoctoral Researcher, University of Helsinki Physics Department (6.2021-present)  
Stage II of the “4-stage” research career model  
Studying hybrid-Vlasov simulations of Earth’s magnetosphere, with PI Minna Palmroth

## Previous work experience

- Research Scientist I, LASP, CU-Boulder (8.2019-5.2021)  
Studied Martian magnetosheath and ionosphere, with supervisor Laila Andersson
- Lecturer, CU-Boulder (6.2020-7.2020)  
ASTR 2600—“Introduction to Scientific Programming”
- Research Assistant, UW-Madison, (Summer 2012-Summer 2015 & Fall 2017-Summer 2019)  
Studied solar wind plasma physics, with advisor Prof. Stanislav Boldyrev
- Teaching Assistant, UW-Madison (9.2015-8.2017)  
Physics 202—Electricity and magnetism for engineering students
- Researcher — Space Sciences Laboratory, Berkeley, CA  
Undergraduate Research Assistant (6.2008-5.2011), Junior Specialist (5.2011-7.2012)  
Worked on kinetic physics in the solar wind, with Prof. Stuart Bale

## Research funding and grants

- PRACE—The Partnership for Advanced Computing in Europe (2021)  
Title: “Magnetosphere-Ionosphere coupling in 6D (MIC6D)”  
PI Prof. Minna Palmroth, Co-PI Dr. Lucile Turc  
Wrote “Validation” (of Vlasiator) section, in successful application for Tier-0 resources.
- NASA Heliophysics Guest Investigator–Open call (2017)  
Title: “Scaling Properties of the Strahl in the Solar Wind Electron Distribution Function”  
PI Prof. Stanislav Boldyrev  
Helped write funded grant NASA 80NSSC18KO646, which supported my PhD (2018-2019).

## Research output

- Restored strahl detector data from the Wind satellite’s Solar Wind Experiment.  
Published full data set WI\_STRAHLO\_SWE at <https://cdaweb.gsfc.nasa.gov>
- 7 first-author refereed journal publications  
16 others co-authored

Selected publications (kinetic physics, electrons, space weather, charging, magnetosheaths):

1. **K. Horaites**, E. Rintamäki, I. Zaitsev, L. Turc, M. Grandin, G. Cozzani, H. Zhou, M. Alho, J. Suni, F. Kebede, E. Gordeev, H. George, M. Battarbee, M. Bussov, M. Dubart, U. Ganse, K. Papadakis, Y. Pfau-Kempf, V. Tarvus, and M. Palmroth. Magnetospheric Response to a Pressure Pulse in a Three-Dimensional Hybrid-Vlasov Simulation. *JGR (Space Physics)*, 128(8): e2023JA031374, Aug. 2023. doi: 10.1029/2023JA031374  
→ *A Vlasiator validation study concerning space weather and magnetopause oscillations.*
2. **K. Horaites** and S. Boldyrev. The heliospheric ambipolar potential inferred from sunward-propagating halo electrons. *MNRAS*, 515(4):5135–5144, Oct. 2022. doi: 10.1093/mnras/stac2051  
→ *Solar wind study, applying “Liouville mapping” technique to observed solar wind eVDFs.*
3. **K. Horaites**, L. Andersson, S. J. Schwartz, S. Xu, D. L. Mitchell, C. Mazelle, J. Halekas, and J. Gruesbeck. Observations of Energized Electrons in the Martian Magnetosheath. *JGR (Space Physics)*, 126(4):e28984, Apr. 2021. doi: 10.1029/2020JA028984  
→ *Analysis of electron energization in Mars’s magnetosheath, using Liouville mapping.*
4. S. J. Schwartz, L. Andersson, S. Xu, D. L. Mitchell, H. Akbari, R. E. Ergun, C. Mazelle, S. A. Thaller, A. R. N. Sales, **K. Horaites**, G. A. DiBraccio, and K. Meziane. Collisionless Electron Dynamics in the Magnetosheath of Mars. *GRL*, 46(21):11,679–11,688, Nov. 2019. doi: 10.1029/2019GL085037  
→ *A theoretical study of nonlocal electron dynamics in Mars’s magnetosheath.*
5. **K. Horaites**, S. Boldyrev, and M. V. Medvedev. Electron strahl and halo formation in the solar wind. *MNRAS*, 484(2):2474–2481, Apr. 2019. doi: 10.1093/mnras/sty3504  
→ *Kinetic model of the solar wind electron halo and strahl populations.*
6. **K. Horaites**, P. Astfalk, S. Boldyrev, and F. Jenko. Stability analysis of core-strahl electron distributions in the solar wind. *MNRAS*, 480(2):1499–1506, Oct. 2018a. doi: 10.1093/mnras/sty1808  
→ *Theoretical/numerical analysis of kinetic stability of eVDFs in the solar wind.*
7. **K. Horaites**, S. Boldyrev, L. B. Wilson, III, A. F. Viñas, and J. Merka. Kinetic Theory and Fast Wind Observations of the Electron Strahl. *MNRAS*, 474:115–127, Feb. 2018b. doi: 10.1093/mnras/stx2555  
→ *Theory of the electron strahl and verification with high-resolution satellite data.*
8. **K. Horaites**, S. Boldyrev, S. I. Krasheninnikov, C. Salem, S. D. Bale, and M. Pulupa. Self-Similar Theory of Thermal Conduction and Application to the Solar Wind. *Physical Review Letters*, 114(24):245003, June 2015. doi: 10.1103/PhysRevLett.114.245003  
→ *A novel simplification of the kinetic equation and comparison to Helios satellite eVDFs.*
9. M. P. Pulupa, S. D. Bale, C. Salem, and **K. Horaites**. Spin-modulated spacecraft floating potential: Observations and effects on electron moments. *JGR (Space Physics)*, 119:647–657, Feb. 2014. doi: 10.1002/2013JA019359  
→ *Inferring the anisotropic charging of the Wind spacecraft using eVDF measurements.*
10. S. Boldyrev, **K. Horaites**, Q. Xia, and J. C. Perez. Toward a Theory of Astrophysical Plasma Turbulence at Subproton Scales. *ApJ*, 777:41, Nov. 2013. doi: 10.1088/0004-637X/777/1/41  
→ *A theory paper where I contributed a linear analysis of small-scale kinetic waves.*

### Research supervision and leadership experience

- Led interview process for summer student applicants at UH (February 2022)  
Conducted several interviews for our group, contributing to 3 summer hires.
- Mentored undergraduate researcher (summer 2022)  
Project: Simulation analysis of magnetopause oscillations  
Co-authored publication [1] in above list (2023)

## Teaching merits

- University-level teaching experience:  
Teaching Assistant (2 years), Lecturer (1 summer)  
at present: Teaching Assistant for FYS 2016 ("Electrodynamics") at University of Helsinki
- Guest Lecturer, PAP 323 "Advanced Space Plasma Physics" at University of Helsinki (3.2022)  
"The impact of space weather events on the magnetosphere and human infrastructure"  
Lectured and developed course reading material.
- "Workshop in College Physics Teaching" (Spring semester 2017)  
Attended course (Physics 603) on developing teaching skills at UW-Madison.
- 5-week training "Improvitational Theater for Scientists" at UW-Madison (Spring 2016)  
Attended training on using improv techniques in science communication.
- Sylvan Learning Center, Medford, OR, USA (summer job, 2007)  
Taught remedial math to children ages 6-14

## Awards and honours

- Student Research Grants Competition Conference Presentation Award, UW-Madison (summer 2019)

## Other key academic merits

- Co-organizer of SHINE Conference Working Group—"Ion and Electron Distributions in the Solar Wind: Kinetic Physics" (2018 & 2019)  
Facilitated SHINE session, with Daniel Verscharen and Kris Klein
- Refereed 7 peer-reviewed publications in total
- Invited Talks:
  1. "The Heliospheric Ambipolar Potential Inferred from Sunward-Propagating Halo Electrons"—Parker Solar Probe QTN/Electron Working Group (April 2022)
  2. "Calm Before the Storm: Preparing for the first Carrington-scale hybrid-Vlasov simulations of Earth's Magnetosphere"—Center for Integrated Plasma Studies, remote seminar (December 2021)
  3. "Theory and Observations of Runaway Electrons in the Solar Wind"—European Space Astronomy Centre (ESAC), Madrid. Topic: Solar Wind Electrons within 1 AU (May 2019)

## Scientific and societal impact

- Organizer of bi-weekly theory study group, University of Helsinki (2.11.2023-present)
- Planning and presenting at space physics exhibit, Night of Science, Helsinki (27.1.2024)
- Associate Editor, Discover Space (2.2024-present)
- Review Editor, Space Physics, Frontiers journals
- Guest on Youtube podcast "Ideal Observer" (1.2018)
- Wisconsin Science Festival—volunteer at plasma physics table (Fall 2016)
- Science Expeditions at UW-Madison—volunteer at plasma physics table (Spring 2016)
- Presented SHINE Conference student tutorial—"The Solar Wind" (22.6.2014)

## Other

- Board of Directors, Boulder Cooperative Food, Boulder, CO, USA (4.2020-6.2021)  
Secretary, Webmaster roles at bulk-food buying cooperative nonprofit
- Board of Directors, Madison Community Cooperative (MCC), Madison, WI, USA (2017-2018)  
Chair, Officer Nomination and Evaluation Committee (ONEC)  
Administered MCC's first digital elections.
- Volunteer Webmaster, Street Pulse Newspaper, Madison, WI, USA (2013)